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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/657,119

09/09/2003

Kazutaka Akiyama

09108.0003

9224

22852 7590 02/27/2007
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EXAMINER

CAO, PHAT X

ART UNIT

PAPER NUMBER

2814

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

02/27/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/657,119

Applicant(s)

AKIYAMA, KAZUTAKA

Examiner

Phat X. Cao

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 15-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-12 is/are rejected.
- 7) ☒ Claim(s) 5, 13 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The Request for Continued Examination filed on 1/11/07 is acknowledged.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-4 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (US. 6,906,374) in view of Matsuoka et al (US. 6,809,364).

Regarding claims 1-2, Tanaka (Fig. 34) discloses a semiconductor device comprising: a semiconductor substrate 4; a first wiring 40 formed above the semiconductor substrate 4 with a first insulating film 36/32 interposed therebetween; an MIM capacitor having a lower metal electrode 54 or 11 (Fig. 1) (column 6, lines 15-16) and an upper metal electrode 58 (column 13, lines 47-50), and formed above the first insulating film 36/32; a second insulating film 48 formed to cover the sides of the upper metal electrode 58 of the MIM capacitor; and a guard ring 54 (see the rightmost 54 and column 11, lines 35-38) buried in the second insulating film 48 surrounding the MIM capacitor, wherein the guard ring 54 (rightmost 54) is provided such that the guard ring 54 is electrically insulated from the wirings and the MIM capacitor.

Tanaka does not disclose the second insulating film 48 formed to cover above top surface of the capacitor and a second wiring formed on the second insulating film 48.

However, Matsuoka (Fig. 22) teaches a semiconductor device comprising: a first wiring 21 formed above a first insulating film 902/903; a capacitor 23 having an upper electrode 24 is covered by a second insulating film 905/906; and a second wiring 26 formed on the second insulating film 905/906 and connected to the first wiring 21 via a hole 25 formed in the second insulating film. Accordingly, it would have been obvious to modify the device structure of Tanaka by forming the second insulating film 48 covering above top surface of the MIM capacitor and by forming a second wiring on the second insulating film because as taught by Matsuoka, such forming of the second insulating film and such forming of the second wiring with the structures above would provide an additional wiring layer desired for the semiconductor device (column 8, lines 52-56).

Regarding claim 3, Tanaka (Fig. 34) further discloses the guard ring 54 formed of tungsten, which is the same material as the lower capacitor electrode (column 6, lines 15-23) and same material as the first wiring 40 (column 11, lines 16-18). Therefore, it would have been obvious to form the second wiring with tungsten which is the same material as the first wiring 40 and the guard ring 54 because tungsten is a well known conductor and commonly used for wiring because of its high conductivity characteristics.

Regarding claim 4, Tanaka (Fig. 34) further discloses the metal ring 54 is in an electrically floating state (no connection).

Regarding claim 10, because the MIM capacitor is completely surrounded by the guard ring 54, the guard ring 54 would inherently cut a seam generated in the second insulating film around the MIM capacitor.

Regarding claim 11, Tanaka further discloses that a width of the guard ring 54 or a dimension of the tubular metal ring 54 is in the range of 0.1 to 1 μm (column 9, lines 14-16).

Regarding claim 12, Tanaka's Fig. 34 further discloses a block insulating film 42 formed between the first and second insulating film to cover the first wiring 40.

2. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka and Matsuoka as applied to claim 1 above, and further in view of Nguyen et al (US. 2004/0092095).

Neither Tanaka nor Matsuoka disclose the second insulating film made of material having dielectric constant as claimed.

However, Nguyen (Fig. 1E) teaches the forming of an insulating film 104 surrounding an interconnect and made of materials including fluorine containing silicon oxide (FSG), carbon containing silicon oxide (SiOC), or porous silicon oxide (par. [0023]). Accordingly, it would have been obvious to form the second insulating film of Tanaka with the materials as set forth above because these dielectric materials having a very low dielectric constant, such as less than about 3, as taught by Nguyen (par. [0023]).

Allowable Subject Matter

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3. Claims 5 and 13-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

See reasons of record.

Response to Arguments

4. Applicant argues that it would not be obvious to combine Tanaka with Matsuoka for suggesting "a second insulating film formed above said MIM capacitor" because Tanaka's interlayer insulation film 48 is not formed above the MIM capacitor and Matsuoka's capacitor is not an MIM capacitor.

The examiner has recognized these shortcomings. It should be noted that the rejection of claims is not based on anticipation, but rather, is based on obviousness. Therefore, this argument has no immediately apparent relevance to the issues presented by the rejection because Applicant cannot show nonobviousness by attacking references individually where the rejection is based upon a combination of references. *In re Young*, 403 F.2d 754, 757, 159 USPQ 725, 728 (CCPA 1968). The examiner relied on the combined teachings at Matsuoka and Tanaka. Matsuoka is not relied on for teaching an MIM capacitor. Tanaka discloses an MIM capacitor. Matsuoka is relied on for teaching that it was known to form a second insulating film covering above the capacitor for the known purpose of providing an additional wiring layer desired for the semiconductor device (column 8, lines 52-56). The examiner thus regards Applicant's assertions as constituting evidence that Applicant has failed to consider as a whole the prior art teachings disclosed by the combining of the references.

Applicant also argues that it would not be obvious to combine Nguyen with Tanaka and Matsuoka because Nguyen fails to teach "second insulating film formed above said MIM capacitor" as claimed.

Applicant's argument again against the references individually. This argument is not proper argument where the references are applied in combination. In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). The examiner relies on the combined teachings of Nguyen with Tanaka and Matsuoka. Nguyen is not relied on for teaching the forming of the second insulating film covering the MIM capacitor. The combination of Tanaka and Matsuoka discloses the second insulating film covering the MIM capacitor. Nguyen is relied on for showing that it was known to form an insulating film surrounding an interconnect and made of materials including fluorine containing silicon oxide, carbon containing silicon oxide, or porous silicon oxide because these insulating materials have a very low dielectric constant (par. [0023]).

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is 571-272-1703. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PC
February 16, 2007


PHAT X. CAO
PRIMARY EXAMINER